

REMARKS

In the Office Action dated February 26, 2007, claims 1 and 2 were provisionally rejected on the basis of non-statutory obviousness-type double patenting as being unpatentable over claims 1-21 of copending application number 10/806,875. The Examiner stated that although the conflicting claims are not identical, they are not patentably distinct from each other because the claims in the '875 application are directed to a method of detecting breathing cycle information with ultrasound and then obtaining B-images, which the Examiner stated anticipates the claims in the current application.

This double patenting rejection is respectfully traversed for the following reasons. Claims 1 and 2 as originally filed required not only generating a number of ultrasound B-images, but registering those B-images and combining the registered B-images to form a three-dimensional image of a body region. None of claims 1-21 of the '875 patent make any mention whatsoever of generating a three-dimensional image in any form, much less in the manner set forth in claims 1 and 2 of the present application.

Moreover, the claims of the '875 patent describe only the generation of ultrasound data, and do not require that any image be generated therefrom, even a two-dimensional image. This is because the subject matter of the '875 patent is not concerned with imaging per se, but is for the purpose of determining a breathing cycle waveform from ultrasound data. For the purpose of determining this waveform, it is only necessary that the raw data be analyzed. Whether an image is or is not generated from the data is irrelevant for the purposes claimed in the '875 application. It is true that claim 21 states that the breathing motion is tracked in "B-

mode frames of data” but this only refers to a way of organizing, segregating or arranging the data, and still does not require that an actual B-image be generated from the raw ultra-sound data.

Moreover, as discussed below in response to the prior art rejection, independent claim 1 has been amended to make clear that the B-images of respectively different slices are obtained from ultrasound radiation that is emitted into a body region in one stationary scan plane. No such limitation is set forth in the claims of the '875 application.

Moreover, it must be remembered that an obviousness-type double patenting rejection can only be based on the *claims* of a copending application or the *claims* of an issued patent, and the *disclosure* of the application or patent is not relevant for formulating such a rejection.

In view of the complete absence of the aforementioned features from the '875 claims, which features are explicitly stated in claims 1 and 2 of the present application, withdrawal of the obviousness-type double patenting rejection based on the '875 claims is respectfully requested.

Claims 1 and 2 also were rejected under 35 U.S.C. §102(e) as being anticipated by Ng et al. Claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ng et al in view of Hassler et al.

These rejections are respectfully traversed for the following reasons.

First, with regard to the rejection under 35 U.S.C. §102(e), it is not understood why this particular subsection of 35 U.S.C. §102 was relied on, rather than 35 U.S.C. §102(a) or 35 U.S.C. §102(b). It is of course the case that the application that issued as the Ng et al patent was filed in the United States before the invention by the

present Applicants of the subject matter claimed in the present application. Since the Ng et al patent issued before Applicants' filing date, as well as before Applicants' priority date in Germany, however, usually 35 U.S.C. §102(a) and/or 35 U.S.C. §102(b) is used under such circumstances. Nevertheless, Applicants do not disagree that the Ng et al patent is available as prior art against the claims of the present application.

As to the merits of the rejection itself, the Examiner stated that Ng et al disclose a method for generating a three-dimensional ultrasound image of the body region of a patient, with the body region exhibiting spatial variation due to breathing motion. In substantiation of this statement, the Examiner cited column 1, lines 44-60 and column 2, lines 12-24 of the Ng et al reference. Applicants do not find any disclosure whatsoever in those passages, however, of the generation of a three-dimensional ultrasound image, and in fact lines 51-52, which are within the passage in column 1 cited by the Examiner, explicitly refer to a two-dimensional pulse inversion image.

Applicants acknowledge that the Ng et al reference makes a passing mention to generating a three-dimensional image in an image rendering step 182 in a passage also cited by the Examiner at column 3, lines 48-67. Such three-dimensional image rendering, however, is not mentioned anywhere else in the Ng et al reference, and no details of this three-dimensional image rendering are given anywhere in the Ng et al reference. A person of ordinary skill in the field of image processing reading this passage, therefore, would simply assume that a three-dimensional image is rendered from the two-dimensional B-scan that is described earlier in the passage cited by the Examiner in the Ng et al reference.

In the Ng et al reference, the goal is to remove or reduce image artifacts in a single 2D scan image, such as a B-scan image, of a body region of a subject. Such image artifacts arise due to motion in the body region, such as breathing motion. The Ng et al reference is particularly concerned with eliminating or minimizing such motion artifacts that arise in the case of the ultrasound energy being emitted in pulses, because it is unavoidable that a certain time will elapse between successive pulses, during which time the body region moves slightly due to the breathing motion.

The Ng et al reference, however, is concerned with generating a single 2D B-scan image of the body region in question, and therefore is concerned with processing the raw ultrasound data for the purpose of removing image artifacts in that 2D image.

The method disclosed and claimed in the present application, by contrast, is for the purpose of generating an ultrasound image of a 3D volume of a subject exhibiting motion while the ultrasound data are being acquired, such as breathing motion. In the inventive method, ultrasound energy is radiated into the examination region in a single stationary scan plane. Due to the motion of the body region relative to this stationary scan plane, however, data are acquired in different slice planes of the body region. In accordance with the invention, a B-image is generated from the data acquired in each of these different slice planes, and then the multiple B-scan images are combined to form a 3D image.

As noted above, the Ng et al reference is instead concerned with reducing motion artifacts in a single 2D B-scan image. Even in the very general language noted by the Examiner concerning 3D image rendering, there is no reason to believe

that such 3D image rendering would be obtained from multiple B-images respectively obtained by irradiating a single, stationary slice plane. Even if multiple B-images are used to produce such a 3D image rendering in the context of Ng et al, a person of ordinary skill would assume that these multiple B-scan images are acquired in the usual way, namely by moving the ultrasound applicator across the examination subject to scan a number of *different* scan planes in the subject.

Moreover, even in the explicit language of the Ng et al reference concerning 3D image rendering, it is only stated that the 3D image rendering is achieved by forming the image information into three-dimensional presentations (column 3, lines 63-64). This means that the 3D image rendering could be obtained by operating on the raw image data itself, without even going through the intermediate step of forming one (or more) 2D B-scan images from the raw data.

The Ng et al reference, therefore, does not disclose all of the elements of claim 1 as arranged and operating in that claim, and therefore does not anticipate claim 1, nor does the Ng et al reference anticipate claim 2 depending from claim 1.

The above discussion is also applicable to the rejection of claim 3 under 35 U.S.C. §103(a) as being unpatentable over Ng et al in view of Hassler et al. Even if the Examiner's statements concerning Hassler et al reference are correct, from the above discussion it is clear that modification of the Ng et al reference in accordance with the teachings of Hassler et al still would not result in the subject matter of claim 3, which embodies the subject matter of claim 1 therein.

All claims of the application are therefore submitted to be in condition for allowance, and early consideration of the application is respectfully requested.

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